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Full Length Research

Adaptation study of improved mung bean (*Vigna radiate*) varieties at Alduba, south Omo, Ethiopia

Wedajo Gebre *

Southern Agricultural Research Institute, Jinka Agricultural Research Center, Jinka, Ethiopia.

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A field experiment was conducted at Alduba Sub Research Station in Bena Tsemay Woreda, South Omo Zone of Southern Ethiopia using three improved mung bean varieties under rain fed condition during 2013 and 2014 cropping season. The study was envisaged to assess the adaptability of three improved mung bean varieties (MH-97-6(Boreda), N-26, and Shawarobit) at Alduba sub-station in Bentsemy woreda. The field experiment was laid out in a randomized complete block design (RCBD) with three replications for two years (2013 and 2014) in six rows per plot with 1.8m wide and 4m long, and with spacing of 30cm between rows and 10cm between plants. Results revealed that MH-97-6 (Boreda) (2.57qt/ha) showed to be best performer variety followed by N-26(2.10qt/ha) and shewarobit (2.07qt/ha). Since the yield obtained in this study is very low as compared to the potential of varieties. Even the variety Boreda (MH-97-6) (2.57qt/ha) gave below its potential which is 8.6qt/ha. Another study with including of new variety is mandatory. Until another study result come, if the above mentioned variety MH-97-6 is demonstrated and popularized to the small scale holder farmers, it can boost the income of poor farmer.

Key words: Mung bean*, Vigna radiate*, Alduba, adaptation.

INTRODUCTION

Mung bean (*Vigna radiate*) is a warm season annual grain legume. The optimum temperature range for good production is 27- 30°C (Imrie, 1998). Mung bean is a quick crop, requiring 75–90 days to mature. It is a useful crop in drier areas and has a good potential for crop rotation and relay cropping with cereals using residual moisture. Smallholder farmers in drier marginal environments in Ethiopia grow mung bean. In southern Ethiopia, Farmers in some moisture stress areas (Gofa, Konso, south Omo zone and Konta) have been producing mung bean to supplement their protein needs and also effectively use scanty rainfall (Asrate et al., 2012). There is a need to expand its production to other potential areas where moisture stress is a challenge for producing long maturing crops. Even in mungbean producing areas, its farming is based on local cultivars that are low yielder, late maturing and susceptible to disease. These varieties are challenged by current climate change. Moreover, there is huge demand for mung bean in the international market particularly in south-east Asia. However, the improved varieties are not yet exposed to farmers in moisture stress areas particularly in south Omo. Therefore, this activity was carried out to test and select the best performing Mung bean variety for the target areas.

MATERIALS AND METHODS

Site description, experimental material and trial design

Field experiment was conducted at Alduba sub station in Bena Tsemay woreda of Southern Ethiopia in 2013 and 2014 cropping season. .Alduba is located about 720 kms from South of Addis Ababa. Geographically, Alduba is found at E 360 36' 30.8" Longitude and N 050 25' 00" Latitude and at an altitude of 1343 meters above sea level. The treatments involved were three improved varieties of mung bean (MH-97-6 (Boreda), N-26,

*Corresponding author. E-mail: wedajo2009@yahoo.com

Table 1. Mean values of yield and yield components of mung bean varieties during 2013 cropping season at Alduba.

Variety	DTH	DTM	PH	NPPP	BNPP	NSPP	TSPP	HSW	GY(qt/ha)
MH-97-6(Boreda)	35.7	57.3	22.0	7.5	2.5	6.8	51.3	50	3.23
N-26	36.0	58.3	20.9	6.4	2.9	6.7	42.2	50	1.93
Shewarobit	36.0	59.0	21.1	7.8	2.4	6.9	54.3	45	2.20
LSD	2.8	3.2	3.7	1.9	0.8	3.1	17.7	20.7	79.5

DTH= days to heading, DTM=days to maturity, PH= plant height(cm),NPPP= number of pods per plant, BNPP= Branch number per plant, NSPP= number of seeds per plant, TSPP= total seeds per plant, HSW= hundred seed weight(gm)

Table 2. Mean values of yield and yield components of mung bean varieties during 2014 cropping season at Alduba.

Variety	DTH	DTM	PH	NPPP	BNPP	NSPP	TSPP	HSW	GY(qt/ha)
MH-97-6(Boreda)	41.3	60.3	25.3	8.6	3.8	7.8	62.6	9.1	2.79
N-26	43.0	60.0	22.8	5.8	2.6	6.4	38.7	5.6	2.03
Shewarobit	42.3	61.0	23.3	7.8	2.8	6.6	45.4	3.3	1.94
lsd	4.6	3.9	5.4	1.8	0.8	1.3	13.9	2.1	45.0

DTH= days to heading, DTM=days to maturity, PH= plant height(cm),NPPP= number of pods per plant, BNPP= Branch number per plant, NSPP= number of seeds per plant, TSPP= total seeds per plant, HSW= hundred seed weight(gm)

Table 3. Mean values of yield and yield components of mung bean varieties combined over season.

Variety	DTH	DTM	PH	NPPP	BNPP	NSPP	TSPP	HSW	GY(qt/ha)
MH-97-6(Boreda)	43.2	58.8	23.7	8.0	3.2	7.3	56.9	7.1	**2.57**
N-26	44.5	59.2	21.9	6.0	3.5	6.6	40.5	5.3	**2.10**
Shewarobit	44.3	60.2	22.2	7.8	2.6	6.5	49.9	3.9	**2.07**
lsd	1.8	1.9	3.5	1.0	1.6	1.2	8.2	1.2	41.1

DTH= days to heading, DTM=days to maturity, PH= plant height(cm),NPPP= number of pods per plant, BNPP= Branch number per plant, NSPP= number of seeds per plant, TSPP= total seeds per plant, HSW= hundred seed weight(gm)

Shawarobit. The field experiment was laid out in a randomized complete block design (RCBD) with three replications for two years in six rows per plot with 1.8m wide and 4m long, and with spacing of 30cm between rows and 10cm between plants.

Data were taken on days to 50% heading, days to maturity, plant height, number of pod per plant, branch number per plant, number of seed per pod, total seed number per plant weight, thousand seed weight and grain yield (g/plot).

RESULTS AND DISCUSSION

The collected data was subjected to analysis of variance (ANOVA) by using GLM procedure of SAs software (version 9.1) According to the result of analysis of variance: There is highly significant difference between varieties for seed yield during two trial season (2013 and 2014). During 2013 (Appendix-1), there was non-significant difference between varieties for traits being considered but in 2014 (Appendix-2) except for branch number per plant(n), plant height(cm) and day to flowering (DTF), there was significant different between varieties for the rest of traits being recorded.

In the combined ANOVA (Appendix 3), there was significant difference between for all the traits being considered except for grain yield(g), Days to follower, plant height(cm), and branch number per plot(n). The interaction effect of year with variety was significant for hundred seed weight (HSW) and total seeds per plant (TSPP), which implies the varieties performance for this traits is not variety potential/its actual potential/ but it is cumulative effect of year and variety.

Mean performance

Differences in mean performance of the mung bean varieties for the characters studied in two seasons (2013 and 2014) at Alduba sub-station is presented in the Tables 1, 2 and 3. The results indicated that the differences among the means of the mung bean varieties for grain yield was significant at 5% probability level for all experimental conditions/seasons/, both during 2013 and 2014 cropping season. During 2013 cropping season the

highest yield (3.23qt/ha) was produced by variety MH-97-6 (Boreda) while the lowest yield (1.93) was obtained from variety N-26 and variety shewarobit produced medium mean seed yield (2.20qt/ha). During 2014 cropping season the highest yield (2.79qt/ha) was produced by variety MH-97-6 (Boreda) while lowest yield (1.94qt/ha) was obtained from variety shewarobit and variety N-26 gave medium mean seed yield (2.03qt/ha).

Across season the highest seed yield (2.57qt/ha) was produced by variety MH-97-6 (Boreda) followed N-26() and Shewarobit. The higher yield of variety MH-97-6 may due to higher number pods per plant^{-1} (8) and number seeds per pods^{-1} (57). Significant effect of mung bean genotypes on seed yield had been reported by Omid 2008; Ahmad et al. (2003) and Khan et al. (2003).

Conclusion and Recommendation

Generally, the present study entails the presence of significant variations among mungbean varieties. Results revealed that MH-97-6 (Boreda) (2.57qt/ha) showed to be best performer variety followed by N-26(2.10qt/ha) and shewarobit (2.07qt/ha). Since the yield obtained in this study is very low as compared to the potential of varieties. Even the variety Boreda (MH-97-6) (2.57qt/ha) gave below its potential which is 8.6qt/ha as indicated in the study (Asfaw et al. 2014). Another study with including of new variety is mandatory. Until another study result come, if the above mentioned variety MH-97-6 is demonstrated and popularized to the small scale holder farmers, it can boost the income of poor farmer.

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APPENDIX

Appendix 1. Mean square values of yield and yield components of mung bean varieties tested during 2013 cropping season.

Source of Variation	DF	DTH	DTM	PH	NPPP	BNPP	NSPP	TSPP	HSW	GY
Replication	2	0.11ns	2.8ns	3.5ns	0.4ns	0.4ns	0.28ns	23.7ns	133.3ns	7308.4ns
Treatment	2	0.11ns	2.1ns	1.0ns	1.6ns	0.2ns	0.04ns	119.8ns	25.0ns	1010.0*
Error	4	1.6	1.9	2.7	0.7	0.1	1.9	61.1	0.8	1230.9
CV		3.5	2.3	7.6	11.7	14.0	19.9	15.8	18.9	19.8

*, Ns =significant and non-significant different at 0.05 probability level respectively, DTH= days to heading, DTM=days to maturity, PH= plant height(cm),NPPP= number of pods per plant, BNPP= Branch number per plant, NSPP= number of seeds per plant, TSPP= total seeds per plant, HSW= hundred seed weight(gm).

Appendix 2. Mean square values of yield and yield components of mung bean varieties tested during 2014 cropping season.

Source of Variation	DF	DTH	DTM	PH	NPPP	BNPP	NSPP	TSPP	HSW	GY
Replication	2	0.1ns	5.4ns	24.9ns	0.3ns	0.19ns	0.68ns	13.5ns	0.6ns	29.2ns
Treatment	2	2.1ns	1.4ns	5.4ns	6.7*	0.12	0.61*	456.3*	25.3ns	3370.1*
Error	4	4.3	3.1	5.8	0.6	0.13	0.32	37.9	0.85	394.3
CV		4.8	2.9	10.1	10.8	11.9	8.5	12.6	15.3	12.2

Appendix 3. Mean square values of yield and yield components of mung bean varieties combined over season.

Source of variation	DF	DTH	DTM	PH	NPPP	BNPP	NSPP	TSPP	HSW	GY
Replication (R)/E	4		7.2ns	7.4	0.3ns	0.9ns	0.9ns	31.5ns	0.5ns	1442.5ns
Treament (T)	2	3.2ns	2.9*	5.6	7.1**	1.3ns	1.3*	411.8*	14.8**	2450.7ns
Year(Y)	1	56.8*	24.5ns	27.4	0.1ns	0.04ns	0.06ns	0.6ns	6.4*	7.3ns
Y*T	2	0.4ns	0.7ns	0.9	1.3ns	3.9ns	1.4ns	164.3*	10.7*8	1072.7ns
Error	8	2.0	2.1	7.6	0.63	1.6	0.9	40.7	0.8*	1022.5
Cv		1.8	2.4	1.2	10.9	40.8	13.8	13.0	16.9	19.7

*, Ns =significant and non-significant different at 0.05 probability level respectively, DTH= days to heading, DTM=days to maturity, PH= plant height (cm), NPPP= number of pods per plant, BNPP= Branch number per plant, NSPP= number of seeds per plant, TSPP= total seeds per plant, HSW= hundred seed weight(gm).